Issue 41
December 2021

Utah Valley Amateur Radio Club

The UVARC Shack

Do it yourself

Among the many activities available at the UVARC DIY (Do-It-Yourself) Night, there were a couple of soldering stations, and here Jill Woodbury KJ7EFA shows her husband Dave how it's done. People got to practice (some for the first time) how to install an Anderson Powerpole connector, work a digital station, learn about emergency communication, and more.

In this issue of the *UVARC Shack*

October meeting featuring Fox Hunting by Larry WA7ZBO, then our annual November DIY Night.

Silent Key for KD7VPW. *My Shack* spotlights W7KLA. *Amateurs in Action* from the Upper Peninsula of Michigan. *Brass Tacks* on Direct Sampling.

Dear Annette answers whether there's a correlation between wattage and distance. *Hot Tips* on VHF equipment questions. *DIY* for the copper 2-meter J-pole. *The Amateur in You* on unmanned crafts and the "ish" of ham radio.

Please send your ideas, stories, questions, gripes, and photos to ***uvarcshack@gmail.com***

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Club meetings

Recap

October 2021 club meeting – Fox Hunting

Larry Jacobs WA7ZBO gave us a spell-binding presentation on the tips, tricks, and history of hidden transmitter finding, or *fox hunting*. He brought some of his old and current gear he used to perform RDF (radio direction-finding), and demonstrated some of them. What a fun and engaging time! The recording of the October meeting is posted on our YouTube channel.

November 2021 club meeting – DIY night

On November 4th, our club meeting was our annual DIY Night. See page 4 for more photos. You can see the recording of the meeting here.

By the way, many of our past meetings are recorded and posted on the club YouTube channel.

Silent Key

Memorial for a ham who has passed on

Joe Ott, KD7VPW

Joe was the sort of friend you want to have around. Unfortunately, on 09 October 2021, he passed from this life after a final battle with years of health problems.

Here's an excerpt from Joe's obituary:

His best friends were his parents, and he regularly said how appreciative he was of them for taking extra time with him and truly loving him throughout his whole life. The entrepreneurial spirit in him used the skills he was taught by his family to open a bike retail and repair shop, a coin resell, a Volkswagen restoration shop, and become a lead mechanic for Volkswagen in Utah. For all the things he learned from his family, he never was quite sure where he got his "Hippie" attitude towards life though; he regularly wore his peace sign necklace as his badge of honor.

Joe served a mission for the Church of Jesus Christ of Latter-day Saints, and his greatest joy in service was his time as a temple worker, and as a member of a Branch Presidency. It was very tough on his body at times, but his faith got him through it.

It would be a disservice if it wasn't mentioned that he was a licensed ham radio operator, addict, and nerd. He made cheesy T-shirts about this hobby and dedicated his office space to having as much radio equipment as possible. He went to conventions and was able to catch along the way some vintage equipment that he was immensely proud of. He kept this hobby through his whole life and made many of his best friends through it. He was proud of this community because he felt hams provided support to people in emergency situations. His love for all this came because he loved talking to people, and ham was his Zen place to do that.

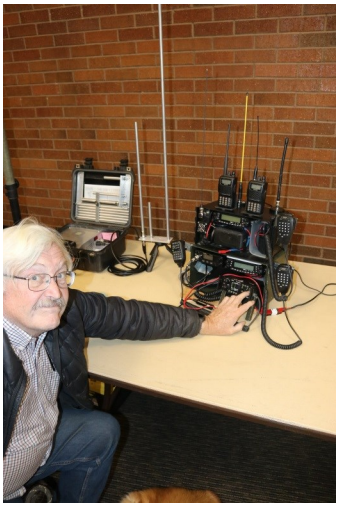
Last but not least, he was a father and grandfather who loved his children and grandkids immensely. He was always ready to offer advice when asked and was ready to listen at all times. He provided a safe place for his family and his welcomed sense of humor could bring the kids to tears at times.

Joe has the kind of voice you don't forget, either. He's kind, thoughtful, and welcoming, as evidenced by the many times he's volunteered helpful information and well-wishes to newer hams on the UVARC New Ham Net, the 76ers Net, Utah County 6-meter Net, and the UVARC HF Net.

73, Joe.

DIY Night

In photos



My Shack

Highlighting the shack (ham equipment and room) of a member, to give others an idea of the possibilities that might work for them

Jim Cooper, W7KLA

I've always been fascinated with everything scientific, and love learning about and improving my understanding of our physical world. I remember riding my bicycle as a boy each week several miles to the MARS station at Elmendorf Air Force Base near Anchorage, where my dad was stationed, to learn about radio communications and attempt Morse code. It was more of a novelty to me, but I did gain an appreciation for the scientific aspects of radio, and for CW. I used to gaze up on those cold winter days at the towers on the tops of the mountains, and wonder how they worked.

My dad was passionate about all things electronic, and I think some of that passion must have rubbed off on me. He would spend many hours in his shop (garage) repairing televisions, radios, and other electronic devices. I still remember vividly, him drilling into me never to reach into a television chassis until I was sure it had been properly grounded, and all the capacitors discharged. Those were the days of cathode ray tubes and huge electrolytic capacitors.

Over the next 50-plus years, I had little more than a passing exposure to ham radio. Then, in July 2021, my next-door neighbor Mike Baxter (WN7UHO) challenged me to study for and get my amateur radio license. On his persistence, I eventually took the challenge, more because of my love of learning, than of a desire to be an amateur radio operator. Since then, I've taken and passed the Technician and General Class exams, and was assigned KK7AGU. I applied for and obtained my current vanity call W7KLA in September 2021 (my dad's CB call sign 50 years earlier was KLA6455). I'm now studying for the Amateur Extra Class license.

I enjoy participating in the UVARC New Ham Net and Family History Net, as well as others. I'm involved in UVARC, UARC, Utah 76ers, and Utah VHF Society. I'm just beginning to assemble my ham shack and antennas. So far, I have a Yaesu FT-991A transceiver and Tek-Power TP30SEWI power supply in my shack, with a Pockrus J-Pole up on my roof. Reception on the 2-meter and 70-cm bands has been stellar. I plan one day soon to add HF capability to my shack so that I can literally expand my horizons.

Today, I've discovered a vast new network of friends with similar interests and a willingness to share and assist. I'm excited for the prospects that ham radio offers. There is so much still to learn and so many new friends to meet.

— 73 de W7KLA

Amateurs in Action

Recounts of ham radio operators who have used their time and skills to help others in a time of need

We were stranded

In October 2015, Thomas (W8TAM) and Julie (K8VOX, now WT8J) Martin had traveled from their home in Ann Arbor, to the Burned Dam State Forest Campground in the Ottawa National Forest of the Michigan UP (Upper Peninsula). They had the entire campground to themselves, and eventually bedded down in the chilly UP air, gazing at the aurora display above.

The next morning, we hopped in the car to warm up, and everything was fine, until a red error light came on the dash with a beep. It wasn't obvious what the light was for, so I looked in the manual. 'Electric power steering'. We decided to drive the car around the campground and see how it worked.... It made it around once, shifted to neutral, lit all the error lights up, and wouldn't go back into drive.

I had brought my Yaesu FT-2900R mobile radio, and a Comet CA-2x4SR 40" antenna on a mag mount. We had food, a water filter, and warmth, but no cell service...we were stranded. I keyed up the radio, and started looking for repeaters, (calling) 'CQ Emergency' three times, and waited. I waited a minute, and called again. This time, Geo Thurner W8FWG responded, and I explained our situation, and where we were. (Because of our scratchy signal), we used the phonetic alphabet to transfer all of that information, to make sure it was understood.

Geo got hold of AAA, but the roadside service folks said that the Martins were too far outside their serviceable area to dispatch help. With that, Geo decided to initiate an emergency net, attempting to organize local hams to find somebody who can help the Martins. Through some relays, Geo got hold of Ted Trudgeon AA8YF, who answered the call, and said he should be at the campground in 25 minutes, then took off.

After one final transmission to Geo, the Martins' car battery finally died. They then turned to their second radio, a Baofeng BF-F8HP handheld. They couldn't hit the same repeater with the HT, even when they switched to the mobile antenna, but it could still receive. So, they were able to listen to the net while they awaited their rescue.

Later, it occurred to Thomas that they might be able to reach Ted on the repeater output, so he switched his Baofeng HT to reverse, and was able to reach him. The Martins guided Ted into their campsite, where Ted jumped their vehicle, and followed the Martins into a nearby town, so they could get their vehicle repaired.

Thomas said he was grateful to everybody who helped that day, to the repeater owner, and to Yaesu for making such a powerful mobile radio. He said that their "lessons learned" were to bring extra batteries, learn the phonetic alphabet, and practice using and running a net. Finally he said, *Listen to your radio, you never know when someone will use it to call for help.*

You can read this story on the Battle Creek Emergency Services Michigan newsletter.

New Hams and Upgrades

New hams

WB6MKX = Mark Miner
KK7BHO = Kevin Reed
KK7BJI = Kathi Anderson
KK7BJJ = Spencer Bennett
KK7BJK = Jane Ervin
KK7BJL = Lynette Funk
KK7BJN = Sharina Hardy
KK7BJO = Jeff Horton
KK7BJP = Leilani Kitz
KK7BJQ = Joy Leavitt
KK7BJS = William MacDonald
KK7BJW = Jennifer Ray
KK7BJX = Aaron Ruben
KK7BJZ = Benjamin Stilson
KK7BKA = Tony Strickland
KK7BKC = Andrew Young
KK7BKD = Peter Young
KK7BNO = Alvin Robison
KK7BPZ = Kade Broderick
KK7BQA = Andrew Christen-sen
KK7BQB = John Conarroe
KK7BQC = Thomas Cooper
KK7BQD = Steve Graham
KK7BQE = Paige Hardman
KK7BQF = Brian Leavitt
KK7BQG = Sue Nelson
KK7BQH = John Simmons
KK7BTA = Samantha Taylor
KK7BZH = Mitchell Baker
KK7BZJ = Teran Peterson
KK7BZM = Major Henry
KK7CBC = Jacob Bartschi
KK7CBD = Robert Bean
KK7CBF = Smith Burton
KK7CBG = Adam Denton
KK7CBH = Paul Gonzalez
KK7CBI = Roger Gonzalez
KK7CBJ = Jared Leblow
KK7CBL = Brent Ring
KK7CBO = Matthew Watson

Upgraded hams

KJ7NXD = Alex Marcum (Extra)
KX3J = Dan Auga (Extra)
N7RIX = Ben Payne (Extra)
K7RCZ = Ron Edwards (Extra)

Congratulations to all these diligent folks! We look forward to hearing you on the radio soon.

Events

Upcoming happenings

UVARC Christmas Potluck

Last year we weren't able to hold our annual UVARC Christmas Potluck because of the you-know-what. Well, this year we're returning with a vengeance. Assuming the Pandemic doesn't throw us out of our location again, we hereby announce that ***the potluck is on!*** Set aside the night of Thursday December 2nd from 6:00 pm, for the biggest potluck of the year, at the Orem Senior Friendship Center, 93 N 400 E. A sign-up sheet has been posted on Facebook.

Santa said he's planning to be there to sample our goodies, so bring your little ones, to get photographed with Jolly Ol' St. Nick himself. Seconds for those who get their photo taken on his lap.

Like usual, we'll also have tables set up in back for you to show off your latest projects.

FCC fees postponed to 2022

You might be aware that, over a year ago, the FCC had announced that they'll start charging fees for amateur radio licenses, upgrades, vanity call signs, and renewals, but that no date had been set. They still haven't announced a date to implement the new $35 fees, but they've now stated in a letter that the new fees will not go into effect until 2022 at the earliest.

To be clear, the fees that exam candidates now pay for exams at the sessions will not change, because they don't involve the FCC. But after each exam session, the FCC will send the passing candidates a link where they can pay the new fee before the license or upgrade can be issued.

76ers Santa Net

The *76ers Santa Net* tradition continues! The revered and long-anticipated net will take place on Thursday December 23 and Friday December 24, at 7:00 pm on the 146.760 MHz repeater. Open to anybody, young or small, who wants to talk with Santa, but there must be at least one person at your station who is licensed.

To participate, simply bring your little ones to the radio, have them announce your call sign into the microphone when Santa asks for them, and when Santa calls for them, they can talk away at will. When they're done, they can say Thanks, give your call sign, and turn it back to Santa. No need for you to say anything, or intervene in any way, unless they're too young to do or say some of that.

The Ugly Antenna Contest

Yes, we're still planning to hold our first-ever Ugly Antenna Contest. Anybody can enter an antenna into the contest, but the owner must demonstrate that it can transmit farther than a city block on an amateur frequency. We'll have three judges who'll decide which working antenna is the ugliest. The top three will win prizes, but first place wins a used HF radio.

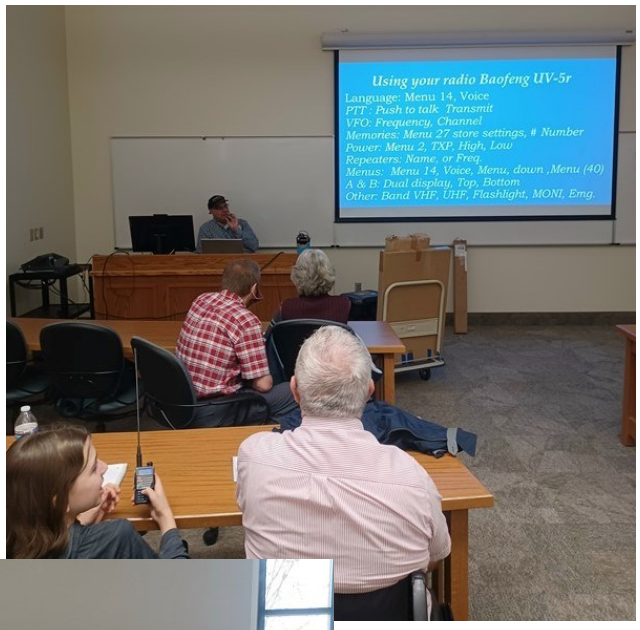
But we're going to need a place for it, so until we can secure one, unlike your ugly antenna, the date is still up in the air. We're getting closer, so stay tuned!

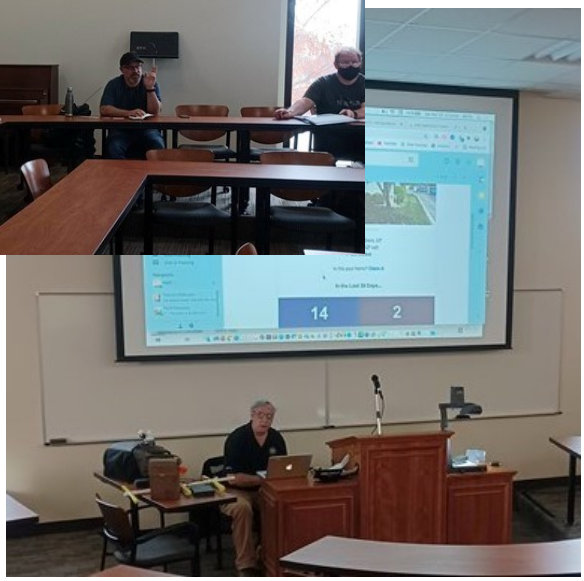
Ham Radio University

In photos

The idea for a *Ham Radio University* came about more than two years ago, as a way to provide newly licensed amateurs a start into the craft by holding post-license classes, in which they can learn more than just the fundamentals in an atmosphere where they can freely ask questions of any kind. We never acted on the thought until October 2021, our first session. Our first instructors were Shawn KJ7SNE, Ryan AF7RS, and Noji KNØJI.

Here are photos from the November 2021 session, which featured instructors Caryn KG7UUR, Keith KB7M, Dave KI6OSS, and Gary KE7UIA.


Using your radio Baofeng UV-5r
Language: Menu 14, Voice
PTT: Push to talk Transmit
VFO: Frequency, Channel
Memories: Menu 27 store settings, # Number
Power: Menu 2, TXP, High, Low
Repeaters: Name, or Freq
Menus: Menu 14, Voice, Menu, down ,Menu (40)
A & B: Dual display, Top, Bottom
Other: Band VHF, UHF, Flashlight, MONI, Emg.

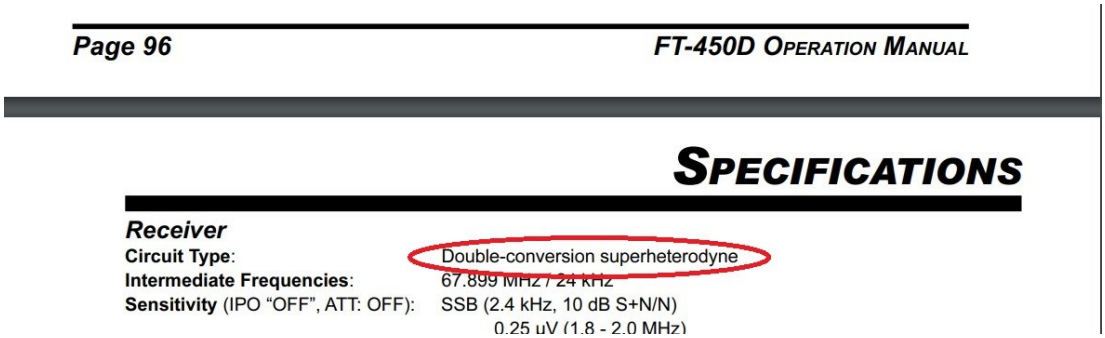


Brass Tacks

An in-depth look at a radio-related topic

Direct sampling

When looking at the specs of a transceiver under the *Receiver* section, you might have noticed a designation such as *Triple-conversion superheterodyne*, *Double-conversion superheterodyne*, or *Direct Sampling*. Some even feature a hybrid, called *Direct Sampling Superheterodyne*. For most of us, those terms mean little. But to those who are concerned with technological advancements in amateur radio, these could represent steps in our progress toward better receiver performance.



Page 96 FT-450D OPERATION MANUAL

SPECIFICATIONS

Receiver

Circuit Type: Double-conversion superheterodyne
Intermediate Frequencies: 67.899 MHz / 24 kHz
Sensitivity (IPO "OFF", ATT: OFF): SSB (2.4 kHz, 10 dB S+N/N)
0.25 µV (1.8 - 2.0 MHz)

Double-conversion superheterodyne receiver specification of the Yaesu FT-450D

As we've moved into the Digital Age, more and more activities have made the transition from purely analog operations to binary, and amateur radio is no exception. In a previous article, I explained what transmitted digital signals look like when viewed on an oscilloscope, for example. This time, let's explore what it takes to convert a received signal to a digital format, and why we would even want to do such a thing.

Receiver

Receiver system	Direct Sampling
Intermediate frequency	36kHz
Sensitivity*	
SSB/CW (at 10dB S/N)	

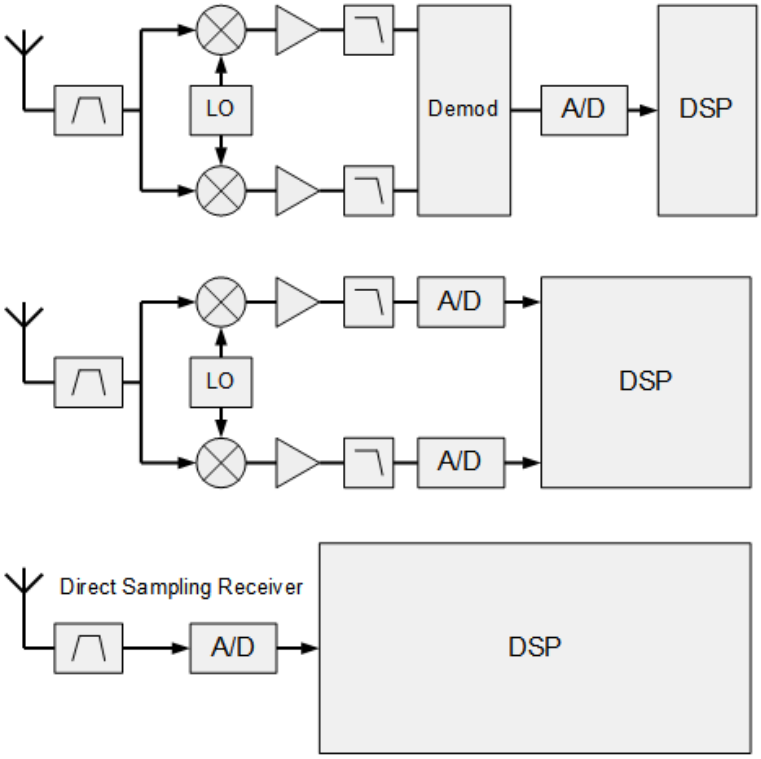
Direct Sampling receiver specification of the Icom IC-7300

Nearly all amateur radio transceivers manufactured today are designed with some amount of digital circuitry, due to the lower cost associated with integrated circuits rather than discrete components (fewer components that can fail), the physical savings in size and weight they present, and the increased ability to process a signal digitally over that of analog methods. This digital heavy lifting is provided primarily by two sections: the ADC (analog-to-digital converter) and the DSP (digital signal processor).

Brass Tacks

continued

As you can see from the following evolutionary diagram, more than twenty years ago, amateur radio transceivers began incorporating DSP, but the large part of the incoming signal's processing still required down-conversion (changing to a lower, easier-to-handle frequency) and demodulation (extracting the audio or other desired signal.) Today's newest transceivers no longer need to down-convert an incoming signal, due to the higher conversion speed of the ADC (labeled here as "A/D"), and demodulation is completely encapsulated in the DSP, essentially turning the receiver into an ***SDR*** (software-defined radio.) Because the ADC can "sample" the incoming signal directly (that is, without mixing or any prior processing), we refer to that method of signal handling and processing ***Direct Sampling*** or *Direct Digital Conversion*.



The job of the DSP, then, is to demodulate the signal, and remove as much noise from the final output signal as technologically possible. And today's digital enhancements, combined with advanced discrete mathematics, are able to refine the signal to a much greater level than has ever been previously achieved. It's beyond the scope of this article to explore the details of modern DSP, but many have asked how an analog signal can be transformed into a digital signal, so let's focus on how an ADC works.

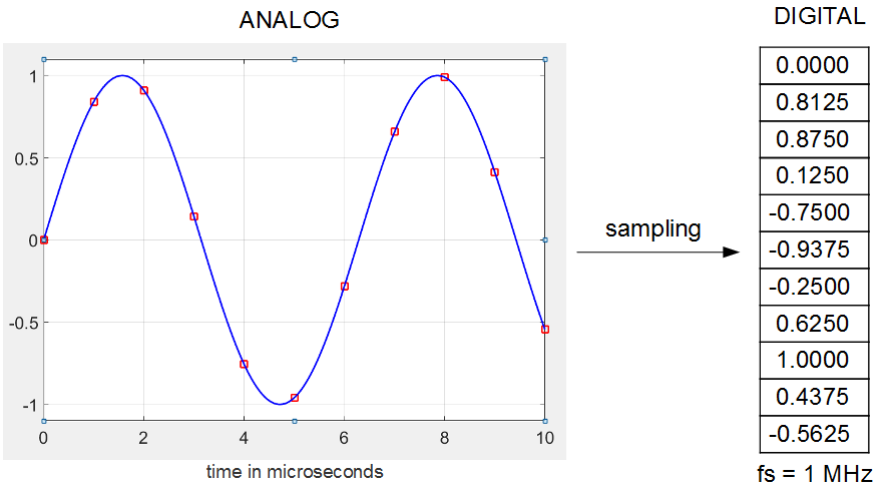
At very consistent intervals, the ADC will take "samples" of the analog signal, by simply measuring its amplitude at those times. Those moments and their intervals are collectively set by a "clock" signal, which operates at a very high frequency, constantly changing from a high level to a low level, then back again. Essentially, the ADC is acting like a voltmeter, recording a list

Brass Tacks

continued

of all the signal's voltages at the times the clock changes from one level to the other. The voltage values, which vary between a negative amount to a positive amount, are then converted into a list of binary values that are usable by the DSP.

For example, if the lowest incoming voltage value (after some amplification) is –3.7 volts, and the highest is +3.7 volts, the ADC might assign the binary value 00000000 to –3.7 volts and 11111111 to +3.7 volts, for a possible 256 voltage value representations. To remove the need of handling negative numbers, a "bias" of 3.7 is added to each value to *normalize* it. The value is then converted to binary by dividing the old range (–3.7 to +3.7, or +3.7 – –3.7 = 7.4) and multiplying the new range (0 to 256, in this case, or 256 – 0 = 256.) This way, when the ADC detects +1.1 volts at one point, it'll record (1.1 + 3.7)/(7.4) x 256 = 166 = 0xA6 = 10100110 as its binary representation. By the same example, when the ADC detects –2.8 volts, it'll record (–2.8 + 3.7)/(7.4) x 256 = 31 = 0x1F = 00011111.



The ADC sends these binary values to the DSP, which collects groups of them over a period of time for demodulation and audio processing, including noise detection and filtering. It also uses each group to calculate the FFT (Fast Fourier Transform) of the signal for frequency-domain examination, to eliminate harmonics, aliases, and images. In fact, numerous calculations are made on each signal group, to more efficiently produce a much cleaner signal than could otherwise be achieved with analog components alone.

Summary

As they say in ham radio, ***It's better to receive than to give***, meaning that our rig design and development time is better focused on the receiver side than on the transmitter. After all, ***If you can't hear 'em, you can't work 'em*** is another pithy maxim that reflects the fact that being able to receive a signal is indispensable toward making a contact. With those in mind, technology advances such as ***Direct Sampling*** have improved our received signal integrity by reducing the need to down-convert the incoming signal, and shifting some of the workload onto the often under-utilized DSP.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Dear Annette

What's on your mind? Serious, humorous, technical, and thoughtful answers to your deepest, (mostly) ham-related questions.

Dear Annette:

Last month, I was at Walmart and saw several employees communicating with each other on 70 cm using Baofeng radios. Should I report them to the FCC? And should I record their transmissions, so I could send them the evidence?

Talman in Saratoga Springs

Dear Talman:

Before you go reporting, or even recording anything, you might want to be sure their business doesn't hold an LMRS license. Since the amateur 70-cm band, for example, is allocated to us on a secondary basis, and many Baofeng radios are FCC certificated (formerly "type-accepted") for Part 90 (LMRS) use, they might be within their privileges. Then, you can let somebody else be the radio police.

Dear Annette:

Is there a correlation between signal wattage and transmission distance?

Tom in Lehi

Dear Tom:

Given the same (equipment, terrain, environmental) conditions between measurements of two signals of different transmitted power levels, yes, there will be a correlation between transmit wattage and ***perceived distance*** between the two stations. No matter the power levels, the ***actual*** transmitted distance will be the same, but the *perceived distance* is determined by the sensitivity of the receiver.

Dear Annette:

Is politics allowed to be discussed on ham radio?

Steve in Alpine

Dear Steve:

Discussing politics on amateur radio is definitely not forbidden by the FCC, but it can polarize people, leading to emotional and often uncivil discussion. If you can briefly mention a political topic in a fair and respectful manner, you're not likely to have a problem. Also, if another ham attempts to ensnare others into a heated or controversial discussion, regardless of topic, it might be wise to refrain from the QSO until cooler heads prevail.

Dear Annette:

What's your favorite flavor of ice cream?

John in American Fork

Dear John:

Moose tracks.

Dear Annette:

If I transmit with too much power, will that cause my signal to go right through the ionosphere, or bounce off it?

Dylan in Eagle Mountain

Dear Dylan:

Probably the largest factor for determining ionospheric refraction ("bouncing off") is frequency, not transmit power. This is because the amount of an RF (radio frequency) signal that's absorbed or refracted is determined by the density of atmospheric charge due to the ionization / recombination rate of air molecules. The charge density and ionization rate then affect incident signals differently for different frequencies.

Got a question for Dear Annette*? Email it to* ***uvarcshack@gmail.com*** *and include your town name. Sorry, no guarantees.*

The Amateur in You, Part 1

What have you been pondering?

The "ish" of ham radio

Several years ago, a ham approached me with a homemade copper J-pole in his hand. He said that he accidentally cut one of the elements about a quarter-inch too short, and asked whether that boo-boo will affect his antenna's performance. I told him that, even if he had tripled that mistake, it would work perfectly. He decided to test my theory, and actually cut it another quarter-inch (believing that, if it no longer worked, he could still add a ½″ cap to the element). When we connected the J-pole to my analyzer, it showed a near-perfect SWR across the 2-meter band.

My friend was puzzled, because the drawing he read specified element lengths down to sixteenths-of-an-inch. Furthermore, he got it on the air, and received nothing but perfect signal reports, even on simplex into the next county. How was it that the plans for the antenna were so detailed, yet still worked, and worked well, even after its actual dimensions deviated this far from the specifications?

Precisely

As one person put it, ***amateur radio is the inexact application of an exact science***. I suppose the same can be said about many disciplines, hobbies, and endeavors.

To be sure, there are indeed times and places in which some degree of preciseness is required in amateur radio, such as the design of some receiver circuits or the ability to remain on a particular transmit frequency. But even those intricate electronics are often augmented by feedback designs that help keep the intended signal within specified limits.

For example, say you own a VHF transceiver, which was designed and built using close-tolerance components, within maybe 1% of their ratings. You tune that rig to 146.520 MHz, but during your transmission, the tuned circuit drifts by 0.5% due to component warming, which is well within tolerance. However, 0.5% off 146.520 MHz could place your signal 732.6 kHz off, at 145.7874 MHz or 147.2526 MHz, nearly a fifth of the entire band in either direction. To correct for this huge deviation, electronic feedback circuitry was developed to help the radio maintain its transmit or receive frequency.

Approximately

This kind of exact engineering is not required for the rest of us mortals, however, especially when we apply our craft to the world of radio waves.

So, why are there so many drawings, plans, and calculations that instruct us to cut our antenna elements to such precise measurements? Because those numbers are intended to only ***give us a starting point***, from which to tune our elements by cutting, raising, and shaping them. We say that the plans help get our lengths *within the ballpark*, and then we're responsible for fine-tuning them for actual use, including the location. In other words, ***ish***, which in our context means "roughly" or "more or less" or "close enough."

What this means is that ***most of the parameters we can control, do not require the fine detail we often imagine***.

Line-of-sight

For example, many will tell you that VHF is useful only by line-of-sight (LOS); that is, only when the two stations are within sight of each other. Yet by experience, we know that we can still communicate by simplex, even when we're out-of-sight from each other, due to knife-edging, ducting (including inversion), signal reflection, and scattering. Still, there are times when two stations are within LOS, and still can't hear each other. So, does VHF require line-of-sight? Ish.

The Amateur in You, Part 1

continued

Power supply voltage

Can we use a power supply or battery specified at 12 volts, when our equipment specifies a requirement of 13.8 volts? Most of the time, yes, because our equipment voltage requirement is often accompanied by a tolerance, typically around 15%, and 12 volts is within that tolerance for 13.8 volts. So, will your 13.8-volt equipment work with a 12-volt supply? Pretty much, ish.

1.0:1 SWR

Many seem to always be looking for that elusive 1.0:1 SWR in their antennas. An SWR greater than 2.0:1 might force your transceiver to reduce its power output, so you should try and keep it below that level. But, as long as the SWR is low enough to keep the transceiver's output power amplifier from reducing its output power, will an SWR of 1.9:1 work for you? Sure it will...ish.

Radials

A few HF ham operators get caught up in the confusion about radial and counterpoise lengths, when it comes to vertical (and a few other) antenna types. Some of them go to great lengths to cut some to precise fractions of wavelengths for each intended band, when in reality, no such exactness is required. If you install radials, cut them all the same length if possible, at least a quarter-wavelength of the lowest frequency you plan to use. For example, if your vertical supports 80, 40, 20, and 10 meters, install eight to sixteen radials, and cut all of them about 66-ish feet long each. If you need to cut a few shorter, that'll still work just fine.

And what if you can only install 13 radials? Or what if you have to bend some of the radials around an obstacle? Or what if your yard is just too small? Is there any hope of you being able to work distant stations under those conditions? Of course, ish.

Car antenna placement

If you were to install an antenna on your car, you're likely told that you should you stick it right in the middle of the roof. That's good, if it's possible, but sometimes there are obstructions, such as roof ribbing, side air bags, and a moon roof. Will your antenna still work if it's not located in the dead center of your roof? Of course it will, ish.

Antenna orientation

And if your antenna orientation is a few degrees off, will that affect your signal performance? Probably not, ish.

Dipole height

You've also been told that you must get your 40-meter dipole at least 66 feet above ground, to work effectively. Will it work if you can only get it up 50 feet? You bet, ish. Or will your NVIS antenna work if it's a little too low-to-the-ground? Yes, ish.

Operating behavior

If I don't speak very loudly, or if I have an accent, or a mild speech impediment, will those keep me from being an effective ham radio operator? Probably not, ish. Or what if I'm a little shy, and hesitate, and trip over my words, or I'm just getting old...should I stay off the radio? Absolutely not!

Let the facts speak for themselves

So, in spite of precisely engineered and calculated directions, it's still possible for you to compromise on some measurements, yet work ham radio effectively. Many of us have installed imperfect antennas, using imperfect feed lines, imperfect radials, imperfect power supplies, and imperfect radios, with less-than-perfect operating habits, and yet enjoy amateur radio almost as well as the ham with the finest setup, ish.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

The Amateur in You, Part 2

What have you been pondering?

Unmanned crafts using amateur radio

Did you know that amateur radio is the type of wireless communication that's used on many kinds of unmanned hobby craft? From airplanes to balloons, ham radio transmitters, and even transceivers, are often the radio of choice for a variety of hobbyists. And we specify "hobby" because amateur radio is not to be used professionally, as you know.

RC airplanes and helicopters

One of the most widespread uses of amateur radio by unmanned aircraft in the 20th Century has been in RC (remote-controlled) aircraft, including helicopters. Many of these unmanned aircraft, regardless how they're propelled, can easily be classified as "drones" by today's standards.

Drones

The ever-expanding field of unmanned multiple-rotor aircraft, or drones, have been used in numerous ways, and many use amateur radio as a means for communicating control, telemetry, video, and data. Recently, some of their pilots have come under fire, however, and even fined, due to having steered them dangerously close to firefighting operations and commercial aircraft, requiring operators to be extra vigilant.

Boats

The very first remote-control use of amateur radio was in operating a watercraft, by Nikola Tesla himself, in 1898. Since then, numerous recreational and sport activities have incorporated amateur radio in controlling seabound and even underwater vessels.

Balloons

Lighter-than-air unmanned craft, such as weather balloons, have also seen amateur radio use early on. A fun activity that has seen some press in recent years is unmanned hobby ballooning, especially those involving amateur radio. A high-altitude balloon might captures video during its trip, then broadcast a beacon on an amateur radio frequency, resulting in a *fox hunt* of sorts, to locate the descended craft.

Satellites

Amateur radio satellites are little more than orbiting repeaters, yet they can accept telecommands to change configurations. Even the Technician-class radio amateur has the ability to enable (turn on) a satellite's repeating capability by sending it a tone.

Space craft, rovers

The ISS (International Space Station) is a manned craft; however, some unmanned space craft were created to retrieve and transmit important data, like the Hubble space telescope. Most of us remember the remotely controlled Martian vehicles Opportunity, Spirit, and Curiosity, as they roved across the red planet surface. And the forever-traveling Voyager spacecrafts have sent us an amazing amount of data regarding our solar system.

No, none of the above spacecraft use amateur radio frequencies, because they're largely professional in nature. But, they're examples of yet another use for unmanned, extraterrestrial radio control.

Others

Earlier, we specified "hobby" use, but what about emergency use, like Search and Rescue, danger zone penetration, and surveillance? Yes, some of those are possible uses for amateur radio in unmanned craft as well.

Do you know of other kinds of unmanned hobby craft that makes use of amateur radio? Please drop us a line and share!

Hot Tips

Good info for the new ham, and old stuff to refresh your memory

VHF / UHF equipment questions

Many of us who are new to ham radio, get our start using the *2-meter band*, which is a subset of the ***VHF band***. This means frequencies starting with **14**, such as 146.520, but this Q&A can be applied to the ***UHF band*** as well. Simply put, this is a short list of many of the questions that you, as a new ham, might ask about VHF / UHF equipment:

Do I need to get a better radio?

If your HT (handheld transceiver) has been working well for you, maybe not. But if you believe a little extra power can help you get your signal out farther, then a mobile radio, used as a desktop base, might be what you need. Then again, if your signal is not reaching others as well as you hope it would, you might benefit by investing in a better antenna.

Should I get a digital radio?

There is quite a lot of talk about digital radio modes on the VHF / UHF bands, such as DMR, C4FM (Yaesu System Fusion), D*STAR, AllStar, and others. If you feel like joining the fun of digital modes, by all means, purchase an appropriate radio. But, be sure to get one that's familiar to people in your club or area, in case you have questions or run into trouble, because often, neither Google nor YouTube will have all the answers you're looking for.

Should I log my contacts?

You can, if you want to, but you might find that it'll become somewhat tedious, due to the numerous contacts you'll make on VHF and UHF. Logging is an activity that's typically more appropriate on the ***HF bands***, which tend to lend themselves better to making international or rare contacts. And if you do log your contacts, be sure to use a desktop, mobile, or online app (such as N3FJP or N1MM or QRZ) to do the job.

Do I need to get a tuner?

If you have a store-bought antenna, you will not need to purchase a tuner, unless there's something wrong with your antenna, in which case you should just replace your antenna. If you're using a home-built VHF / UHF antenna, you only need to install a home-made matching device, if it needs tuning.

Do I need to get a watt meter or an SWR meter?

While it won't hurt to purchase a meter, you really won't need one. Typically, your radio's power output is set to particular levels, and the only time you might need to monitor that, or your antenna system SWR, is when your antenna is not performing well, in which case it might be more beneficial to purchase a better antenna.

Should I purchase an amplifier?

You could, if you want to, although a VHF amplifier is somewhat hard-to-find or is often more expensive and takes up more room than a mobile radio. But, if you need that extra punch to reach a distant station, you might just find that you'll get out farther by investing in a better antenna.

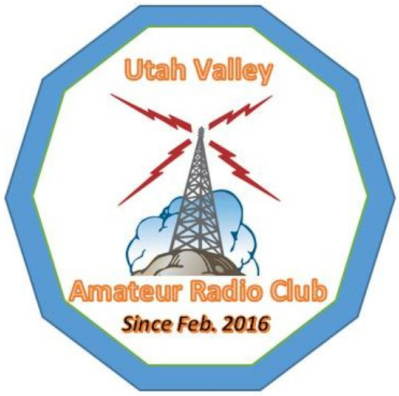
Do I need to get a better antenna?

The answer is a thundering ***YES!*** If all you have is a *stock antenna* (in other words, the antenna that came with your HT), you'll likely do much better with a whip antenna, or even a rooftop antenna connected to your radio by coaxial cable.

Are you sensing a pattern here? While not all your questions can be answered by getting hold of a better antenna, purchasing or making one yourself is probably the best first step toward improving your VHF / UHF station.

DIY

Worthwhile projects you can build on your own



Copper J-pole antenna for 2 meters

One of the most recognized and home-brewed, and yet one of the most maligned 2-meter antennas is the ***copper J-pole***, also called the ***copper cactus***. This inexpensive and durable antenna is not unlike its successor, the open-stub J-pole (the "Pockrus" J-Pole), but supports only 2 meters, has a slightly longer history, and can be found on many homes throughout the US. The copper J-pole has received some bad press because it's known to produce a heavy amount of common-mode noise, but those effects can largely be reduced by installing an RF choke.

Its construction is attractively simple, consisting only of a few pieces of copper tubing, associated copper joints, a coaxial cable connector, and a stiff wire. For many, this is their first home-made antenna, because it works so well. I've added a pair of copper caps, to give the ends of the tubes a finished appearance. The only challenge to building the copper J-pole is the soldering of the copper joints, which does tend to scare away some well-meaning do-it-yourselfers. Let's see what it's going to take, for us to build one.

The solder kit listed here contains the appropriate propane torch, copper pipe solder, the flux, and the flux brush, all necessary for this project, and yet just enough for a small project like this one. Of course, it can be replaced by the same items that you might already have.

Parts list

10 feet of ½″ copper pipe

Two ½″ copper caps

One copper solder propane torch kit

2 inches of 12 AWG solid copper wire

One ½″ copper tee

One ½″ copper elbow

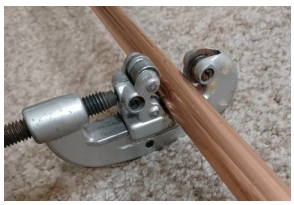
One SO-239 bulkhead connector

One each M3 1″ screw, split washer, nut

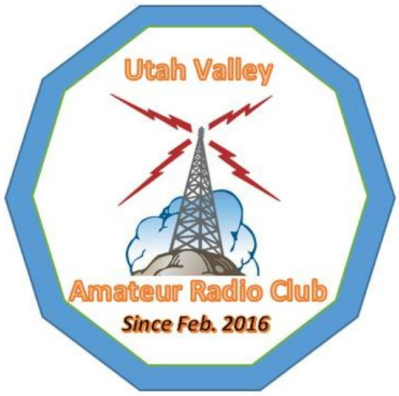
One pipe cutter and some sandpaper will be useful tools. Steel wool is a good copper polisher.

The construction

If you haven't worked with copper pipe before, 1) clean and polish (with steel wool), and flux all joining surfaces; 2) use a tube cutter to keep the tubing round; and 3) de-burr all cuts (with sandpaper.) Cut three pieces of the copper tubing, one 18½″, one 60½″, and one 2″ long. Use the remaining copper tube as a mast.



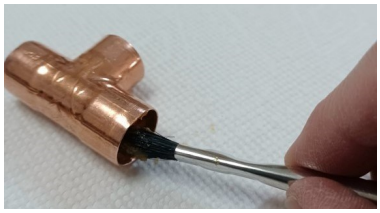
Clean and polish about 1″ of each end of each tube, including one end of the mast tube. Clean and polish about ½″ inside the ends of the elbow, the tee, and the caps. Use the flux brush to smooth on a layer of flux over each cleaned surface, completely covering the join surfaces. Assemble all the copper pieces together, and solder-weld each joint. After the joints cool, scrub the solder with warm water (no soap), to remove the excess and burned flux.



DIY, continued

Copper J-pole antenna for 2 meters

Fluxed outside surface



Inside too

The finished product

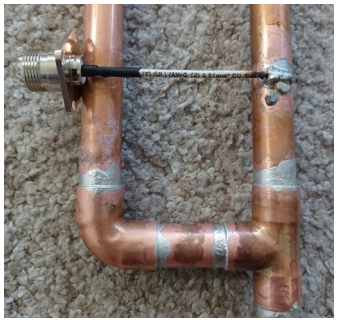
Solder-welded cap

Solder-welded joint

Solder-welds complete

Lay down the connector

Drill the hole



Solder the wire and bolt the connector

DIY, continued

Copper J-pole antenna for 2 meters

Cut a 2″ piece of 12 AWG solid copper wire (can be insulated or bare). Bare about ¼″ off each end, and *quickly* solder one end into the solder cup behind the center pin of the SO-239 bulkhead connector. Soldering it *quickly* will require 1) a hot (greater than 60-watt) soldering iron, 2) tinning the iron before you apply the heat, and 3) applying the heat only long enough for the solder to flow between the wire and the solder cup. Afterwards, I slipped and heated a piece of heat shrink tubing over the solder cup joint to give it a slightly cleaner look.

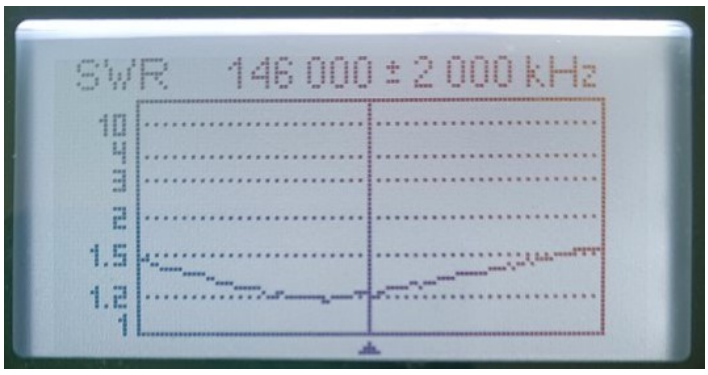
Lay the side of the SO-239 bulkhead connector body on the 18½″ tube, with the wire laying on the 60½″ tube, and positioned about 2¼″ away from the 2″ tube. Many do-it-yourselfers tend to mount the SO-239 bulkhead connector such that the center conductor is attached to the shorter ("stub") tube, but tests show the antenna tends to exhibit better gain with the center conductor attached to the longer side instead.

Rotate the bulkhead so that only one of the four mounting holes is over the 18½″ tube, as shown on the previous page. Drill a 1/8″ hole through that mounting hole, and through both sides of the tube. Use the long M3 machine screw, lock washer, and nut to bolt the bulkhead to the 18½″ tube. Solder the wire to the 60½″ tube.

Test time

Properly testing the copper J-pole will require two environmental modifications, installing an RF choke and moving away from conductive objects. To create an RF choke, simply coil up your coax into an eight-inch diameter of six turns of the coax. After creating and connecting the choke, make sure no part of the choke is higher than the 2″ tube. The easiest way to move away from conductive objects is to go outside, drive a 3-foot piece of metal rod into your yard, and slip the mast of the copper J-pole antenna over the rod. Then, connect your analyzer or radio at least eight feet away from the antenna before testing.

Almost ready for testing



I think that turned out alright

Summary

The copper J-pole antenna is a classical favorite homemade antenna, because it's easy to make and works well. But it does have some inherent issues to address before installing, using, or testing it. Be sure to form an RF choke with the coax when installing the antenna. Total cost is $30 for the parts and $35 for the propane torch kit.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Living in the Past

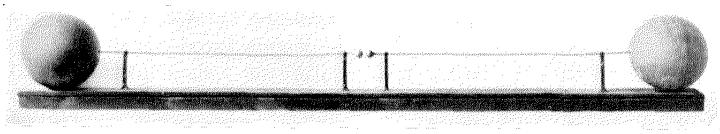
Historical perspective

The discovery of radio waves

A young Heinrich Hertz

In 1864, Scottish mathematician and theoretical physicist James Clerk Maxwell proposed a comprehensive theory of the interaction between electricity, magnetism, and their associated invisible fields, often thought to be well beyond his time. He predicted that not only were they and visible light different manifestations of the same thing, but that they can also exist as changing fields, or waves, yet nobody had found a way to prove their existence.

When Heinrich Hertz, a budding student of science and engineering, applied for his doctorate (22 years old) at the University of Berlin, professor Hermann von Helmholtz, known for his work in physics and physiology, took Hertz under his wing, to research and demonstrate proof of Maxwell's theories. At one point in 1886, Hertz somewhat accidentally discovered that a Leyden jar discharging into a coil resulted in a spark at another coil several feet away. This was his first evidence that Maxwell's theories could be demonstrated, and so he created his first crude radio "transmitter," (and therefore, ***the first antenna***), part of which is shown here. The "receiver" was nothing more than a metal loop, but paved the way for Hertz to better explore the phenomenon.



Further research

By 1889, after refining his equipment and his observations, Hertz was able to conclusively prove that the effects he was observing really were the results of Maxwell's predictions. Because of Hertz's published findings, many began to call these electric—magnetic wave combinations *Hertzian waves*, which today we refer to as *radio waves*. Hertz further demonstrated that Maxwell predicted correctly, that these electromagnetic waves can be manifested as radio waves and visible light, both with the same speed, polarization, and reflection properties.

While we credit Hertz as the first to demonstrate or detect radio waves, there might have been another who did the same earlier, but never published his findings. Even Hertz himself declared, *It's of no use whatsoever...this is just an experiment that proves Maxwell was right*. When asked about the possible applications of these waves, Hertz replied, *Nothing, I guess*. Today, our entire wireless (cell phone, television, wifi, bluetooth, satellite, and yes, amateur radio) empire is built on the application of those Hertzian waves. In honor of Hertz and his contribution to the science of electrodynamics, the SI unit of frequency, ***Hertz*** (abbreviated Hz) is named after him, and means ***cycles per second***.

Side of Bacon

A little ham humor

A	T	L	E	D	R	D	G	N	I	W	T	A	B
W	P	D	J	A	T	E	L	B	U	O	D	I	R
A	B	I	P	F	I	F	W	H	I	P	D	E	H
L	E	S	O	F	D	D	D	Y	B	O	R	E	O
D	V	C	L	A	O	N	L	T	A	I	W	R	M
E	E	O	E	N	K	E	T	E	W	G	E	O	B
T	R	N	W	O	A	L	L	M	D	D	I	R	I
R	A	E	B	H	L	O	O	P	P	U	G	Z	C
E	G	R	O	U	N	D	P	L	A	N	E	E	B
V	E	R	D	G	N	D	I	P	O	L	E	P	E
N	N	U	W	A	A	O	M	O	C	F	D	P	A
I	R	I	R	U	B	B	E	R	D	U	C	K	M
Z	R	R	Y	L	F	R	E	T	T	U	B	R	N
E	E	I	F	O	L	D	E	D	U	D	O	C	D

BATWING
BEAM
BEVERAGE
BUTTERFLY
CUBICAL QUAD
DELTA
DIPOLE
DISCONE
DOUBLET
ENDFED
FAN
FOLDED
GROUNDPLANE
INVERTEDL
JPOLE
LONGWIRE
LOOP
OCFD
RANDOMWIRE
RHOMBIC
RUBBERDUCK
TELESCOPIC
WHIP
YAGI
ZEPP

For Your Insight

Information you could use

Club meeting format

Here's the usual agenda for club meetings, when we're able to meet at the Orem City Council Chamber Room, 56 N State St:

Talk-in frequency on the club repeaters

6:30 pm : Eyeball QSO
socialize / put faces with call signs
radio programmers available to help you

6:45 pm : Call the meeting to order
meeting lineup (agenda) / activities
events / announcements

7:00 pm : Presentation / discussion

7:45 pm : Door prizes

7:55 pm : Dismiss and disassemble

8:00 pm : *Club QSY* to a local eatery

Something you'd like to see at the meetings?

Monthly meeting help

We're grateful for the volunteers who help with various tasks that make our club night just that much more friendly and useful to everybody. Monthly, we need help with

programming radios (thanks, Loren / Ralph / Mickey!)

taking photos or videos during the meeting

operating the talk-in radio

setting up tables and chairs (thanks, Heath!)

Lynx

Websites for your education and leisure

Training items and topics for nets

Ham Radio Nets

Radio programming

76ers Group and UVARC Group on Facebook

Utah Ham Radio Exam Schedule

Send your input to ***uvarcshack@gmail.com***

Test your knowledge

General and Extra review (answers next page)

G8BØ8 : Why is it important to know the duty cycle of the mode you are using when transmitting??

A. To aid in tuning your transmitter
B. Some modes have high duty cycles that could exceed the transmitter's average power rating
C. To allow time for the other station to break in during a transmission
D. The attenuator will have to be adjusted accordingly

EØA11 : Which of the following injuries can result from using high-power UHF or microwave transmitters?

A. Hearing loss caused by high voltage corona discharge
B. Blood clotting from the intense magnetic field
C. Localized heating of the body from RF exposure in excess of the MPE limits
D. Ingestion of ozone gas from the cooling system

Calendar

What's happening
(times are Mountain Time)

Utah County Ham Exam Sessions

BYU J. Reuben Clark Law School building

Sign up at HamStudy.org/sessions

Wed Dec 15, 7:00 to 8:30 pm
Sat Dec 18, 2:30 to 5:00 pm
Sat Jan 15, 2:30 to 5:00 pm
Wed Jan 19, 7:00 to 8:30 pm
Wed Feb 16, 7:00 to 8:30 pm
Sat Feb 19, 2:30 to 5:00 pm

Provo One-day Technician Courses*

Third Saturday Monthly at 8:00 am

BYU Law School Bldg, First Floor, SW corner

** September through April*

2022 Orem Ham Radio Courses

Sign up at psclass.orem.org

Technician : Tue Jan 18, 25, Feb 1, 8
General : Tue Mar 22, 29, Apr 5, 12
Technician : Tue May 17, 24, 30, Jun 7
Extra : Tue Jul 12, 19, 26, Aug 2, 9
Technician : Tue Sep 20, 27, Oct 4, 11

Club Meeting Calendar (6:30 pm)

On YouTube Live, and Facebook Live

December 2*	January 6
February 3	March 3
April 7	May 5
June 2	July 14@

** Potluck at the Orem Friendship Center*

@ Ham Radio Fair, location TBA

Regular Nets

UVARC Ladies' Net, Tue 7 pm, 146.780
DMR Utah Net, Wed 6 pm, TG 3149, CC 1
Utah 76'ers, Wed 7 pm, 146.760
UVARC HF Net, Wed 9 pm, 28.345 / 7.220
UVARC New Ham Net, Thu 7 pm, 146.780
CERT Ham Net, 2nd, 4th Thu 8:pm, 146.780
UVARC 2-meter SSB Net, Thu 9 pm, 144.234
Utah County 6 meters, Fri 8 pm, 50.140
Family History Net, Sat 8 pm, 146.780
UVARC Family Net, Sun 3:30 pm, 146.780
See a larger list of nets at noji.com/nets

Upcoming Contests

RAC Winter Contest
5 pm Fri Dec 17 to 5 pm Sat Dec 18

ARRL Kids' Day
11 am to 5 pm Sat Jan 8

North American QSO Party (NAQP)
11 am to 11 pm Sat Jan 22

Winter Field Day
Noon Sat Jan 29 to noon Sun Jan 30

See a larger list at contestcalendar.com

Answers to *Test your knowledge*

G8BØ8 : **B** (Some modes have high duty cycles that could exceed the transmitter's average power rating)

EØA11 : **C** (Localized heating of the body from RF exposure in excess of the MPE limits)

Vendors

For your convenience

Pockrus Joystick J-pole

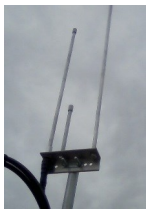
$25, open-stub aluminum half-wave, dual-band J-pole antenna

$35, 6-meter dipole, $20 for the 220 MHz (1.25 m) antenna

by Carl Pockrus, WE7OMG (email omgantennas@gmail.com to order)

Half-wave performance, solid construction, weather-proof, low wind-load

Probably the best-performing outdoor antenna you can get for the price



Super-Elastic Signal Stick

$20, vertical quarter-wave flexible antenna

by Richard Bateman, KD7BBC, of *SignalStuff* (and maker of *HamStudy*)

Super-performing antenna for your HT (handhold transceiver)

Visit SignalStuff and select SMA-Male, SMA-Female, or BNC

Ham Radio Podcasts v1.50

by Trevor Holyoak, AG7GX (email android@holyoak.com)

Stream podcasts (such as *100 Watts and a Wire*, *Amateur Radio Newsline*, *ARRL Audio News*, etc.) or download for later listening

For Android 4.1 and up (ad-free available for purchase)

Club Logo and Call Sign Embroidering

Want your call sign or name (or both!) embroidered on your shirt, your hoodie, your duffle? Or how about a club patch with your call sign?

by Glenna Gardner, WE7SEW (glenna0354@gmail.com or text 801-592-2503)

Call sign or name = $5, Both = $8, UVARC patch = $5, Patch with call = $9

Portable Aluminum J-pole

$49, sectioned, open-stub aluminum half-wave, dual-band J-pole antenna

by Stan, KJ7BDV and Kent, N7EKF (email skantenna@yahoo.com for info or call 801-372-7260)

Complete antenna breaks down into a compact 2″ x 6″ x 12″ package weighing only 3 lbs, perfect for backpacking and portable work where you really need a good 2-meter antenna

HamBadgers

Amateur radio name badges and other products

$10, official UVARC ham radio name badge with the club logo

Visit Ham Badgers and select Ham Radio Clubs > Utah Valley Amateur Radio Club

Email Eric Palmatier at hambadgers@gmail.com or call 919-249-8704

Where everybody knows your call sign

Utah Valley Amateur Radio Club
PO Box 1288

K7UVA
Phone/Text: 801-38-1865
Email: k7uva@arrl.net

Repeaters: 146.780–, 100.0
448.200–, 100.0 224.560–, 100.0
145.250-, 100.0 448.225-, 100.0
Newsletter input?
Email uvarcshack@gmail.com
Need help?
Email uvarcelmer@gmail.com

[See all our newsletters on uvarc.club]

We are the *Utah Valley Amateur Radio Club*, a 501(c)(3) non-profit (EIN 81-360-6416) Utah corporation that was organized in an obscure Orem fire station on 02-05-2016 to provide amateur radio enthusiasts in Utah County and surrounding areas a way to gather and discuss all things ham. Our primary purposes are to provide a local amateur radio resource, help new hams in their new-found adventures, and to give more experienced hams a reason to share their wealth of knowledge and wisdom in a friendly atmosphere of fellowship. We're an ARRL Affiliate and work in cooperation with the Utah VHF Society, but are not subsidiary to them, to ARRL, ARES, or any other organization, although many of our members and leaders might also belong to the same.

This newsletter is copyrighted and published by the Utah Valley Amateur Radio Club, and its purpose is to convey the tone and temperament of the club, to inform and entertain its members, and to entice the rest. To join, go to uvarc.club/join, then sign up at www.facebook.com/groups/uvarc/ to stay informed. For more information about our club or about amateur (ham) radio in general, please email or text or call us.

More than just a club, we invite you to become part of a great ham radio movement in Utah Valley

Our fearless leadership

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Vice President..... Chad Buttars
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Heath Stevenson
Orem City Emergency Manager

From all of us to you, 73